

AMENDMENT

Amendments to the Claims

This listing of claims replaces all prior versions and listings of claims in the subject application:

Listing of Claims:

1. (Currently Amended) A system for sensing and compensating for at least one error signal, the system comprising:

an acoustic pick-up device having a first microphone disposed at a first distance from a desired acoustic source, and a second microphone disposed at a second distance from the desired acoustic source, each of the first microphone and the second microphone receiving acoustic signals generated from the desired acoustic source, and in response, transducing the acoustic signals into audio signals;

a position estimation circuit coupled to receive the audio signals from the first microphone and the second microphone, and adapted to produce an error signal from the audio signals associated with the first and second microphones, the error signal representing an estimate of the acoustic pick-up device having angular and/or distance mispositioning relative to the desired acoustic source that results in the acoustic signals received by the acoustic pick-up device failing to achieve proper and/or adequate noise cancellation and resulting in the acoustic signals being degraded, the position estimation circuit including a first circuit providing first and second time averages of corresponding magnitudes for the audio signals received from the first microphone and the second microphone, respectively, the error signal being produced from the first and second time averages; and

a controller ~~using~~ configured to use the error signal to select a directional response corresponding to at least one of the first and second microphones in order to compensate for the acoustic pick-up device being mispositioned by providing the audio signals from at least one of the first microphone and the second microphone to the output.

2. (Original) The system according to Claim 1, wherein the first circuit comprises a first absolute value detector coupled to a first envelope detector, and a second absolute value detector coupled to a second envelope detector, the first absolute value detector receiving the audio signals from the first microphone, and the second absolute value detector receiving the audio signals from the second microphone.

3. (Previously Presented) The system according to Claim 2, further comprising an indicator utilizing the error signal to generate an indication of the acoustic pick-up device being mispositioned.

4. (Original) The system according to Claim 3, wherein the indicator comprises a visual indicator.

5. (Original) The system according to Claim 4, wherein the visual indicator comprises a light emitting diode disposed proximate to the pick-up device.

6. (Original) The system according to Claim 4, wherein the visual indicator comprises a light emitting diode disposed on the pick-up device.

7. (Original) The system according to Claim 4, wherein the visual indicator comprises a light emitting diode that is a plug-in accessory for the pick-up device.

8. (Original) The system according to Claim 4, further comprising a headset coupled to the acoustic pick-up device, wherein the visual indicator comprises a light emitting diode disposed on the headset.

9. (Original) The system according to Claim 4, further comprising a headset coupled to the acoustic pick-up device, wherein the visual indicator comprises a light emitting diode that is a plug-in accessory for the headset.

10. (Original) The system according to Claim 4, further comprising a handset coupled to the acoustic pick-up device, wherein the visual indicator comprises a light emitting diode disposed on the handset.

11. (Original) The system according to Claim 4, further comprising a handset coupled to the acoustic pick-up device, wherein the visual indicator comprises a light emitting diode that is a plug-in accessory for the handset.

12. (Original) The system according to Claim 3, wherein the indicator comprises an audio indicator.

13. (Original) The system according to Claim 12, wherein the audio indicator comprises a tone generator positioned on the pick-up device, and a speaker coupled to the tone generator.

14. (Original) The system according to Claim 12, wherein the audio indicator comprises a tone generator that is a plug-in accessory for the pick-up device.

15. (Original) The system according to Claim 12, further comprising a headset coupled to the acoustic pick-up device, wherein the audio indicator comprises a tone generator disposed on the headset.

16. (Original) The system according to Claim 12, further comprising a headset coupled to the acoustic pick-up device, wherein the audio indicator comprises a tone generator that is a plug-in accessory for the headset.

17. (Original) The system according to Claim 12, further comprising a handset coupled to the acoustic pick-up device, wherein the audio indicator comprises a tone generator disposed on the handset.

18. (Original) The system according to Claim 12, further comprising a handset coupled to the acoustic pick-up device, wherein the audio indicator comprises a tone generator that is a plug-in accessory for the handset.

19. (Original) The system according to Claim 3, wherein the indicator comprises a sensory indicator.

20. (Original) The system according to Claim 19, wherein the sensory indicator comprises a motion generator disposed on the pick-up device.

21. (Original) The system according to Claim 19, wherein the sensory indicator comprises a motion generator that is a plug-in accessory for the pick-up device.

22. (Original) The system according to Claim 19, further comprising a headset coupled to the acoustic pick-up device, wherein the sensory indicator comprises a motion generator disposed on the headset.

23. (Original) The system according to Claim 19, further comprising a headset coupled to the acoustic pick-up device, wherein the sensory indicator comprises a motion generator that is a plug-in accessory for the headset.

24. (Original) The system according to Claim 19, further comprising a handset coupled to the acoustic pick-up device, wherein the sensory indicator comprises a motion generator disposed on the handset.

25. (Original) The system according to Claim 19, further comprising a handset coupled to the acoustic pick-up device, wherein the sensory indicator comprises a motion generator that is a plug-in accessory for the handset.

26. (Original) The system according to Claim 1, wherein the error signal is determined after the audio signals are received by the position estimation circuit.

27. (Original) The system according to Claim 1, wherein the first microphone and the second microphone are both omnidirectional microphones.

28. (Original) The system according to Claim 27, further comprising a noise canceling microphone signal generated by a difference between the audio signals received from the first microphone and the audio signals received from the second microphone.

29. (Previously Presented) The system according to Claim 1, wherein the position estimation circuit detects the acoustic pick-up device being mispositioned by using a ratio of the audio signals received from the first microphone to the audio signals received from the second microphone.

30. (Original) The system according to Claim 1, wherein the first microphone is an omnidirectional microphone and the second microphone is a directional microphone.

31. (Original) The system according to Claim 1, wherein the controller includes a switch transferring the audio signals from one of the first and the second microphones to the output.

32. (Original) The system according to Claim 1, wherein the controller includes a switch transferring a combined signal to the output, the combined signal generated from a difference between the audio signals received from the first microphone and the audio signal received from the second microphone.

33. (Original) The system according to Claim 1, wherein the controller includes:
a device adapted to produce a combined signal based on the audio signals received from the first and the second microphones, wherein the error signal is used to select the combined signal to be transmitted to the output.

34. (Original) The system according to Claim 33, wherein the device comprises a differential amplifier.

35. (Previously Presented) The system according to Claim 1, wherein the position estimation circuit comprises a sensor capable of determining the acoustic pick-up device being mispositioned.

36. (Original) The system according to Claim 1, wherein the controller includes:
a programmable phase shift network adapted to produce a range of phase shifts in the audio signals from the second microphone; and
a device producing a combined signal based on those signals being phase shifted and on the audio signals received from the first microphone, the device being further capable of transferring the combined signal to the output.

37. (Original) The system according to Claim 36, wherein the device comprises a differential amplifier.

38. (Original) The system according to Claim 1, wherein the first microphone is disposed closer to the desired acoustic source than the second microphone.

39. (Previously Presented) The system according to Claim 1, wherein the position estimation circuit comprises:

a device configured to determine whether the desired acoustic source is operational; and coupled to the device, a sensor configured to determine that the acoustic pick-up device is mispositioned.

40. (Previously Presented) The system according to Claim 39, wherein the audio signals from at least one of the first microphone and the second microphone are provided to the output when the acoustic source is operational and when the sensor determines that the acoustic pick-up device is mispositioned according to a predetermined threshold that is exceeded.

41. (Previously Presented) The system according to Claim 39, wherein the position estimation circuit further comprises:

a second circuit determining progressive levels of the acoustic pick-up device being mispositioned relative to the desired acoustic source; and

a third circuit determining a corresponding phase shift based on a particular one of the progressive levels determined, said corresponding phase shift being introduced with the audio signals received from the second microphone to produce delayed signals, the delayed signals being subtracted from the audio signals received from the first microphone to provide the output.

42. (Original) The system according to Claim 39, wherein second circuit comprises a multi-level comparator, and the third circuit comprises a state machine coupled to the multi-level comparator.

43. (Original) The system according to Claim 39, wherein the corresponding phase shift causes a directional response of the second microphone to have a response pattern including one of a figure eight pattern, a cardioid pattern, a hypercardioid pattern, and an omnidirectional pattern.

44. (Original) The system according to Claim 1, further comprising a headset having the first microphone and the second microphone disposed thereon, wherein the first microphone is disposed closer to the desired acoustic source than the second microphone.

45. (Original) The system according to Claim 1, further comprising a handset having the first microphone and the second microphone disposed thereon, wherein the first microphone is closer to the desired acoustic source than the second microphone.

46. (Original) The system according to Claim 1, wherein the position estimation circuit further includes a position threshold circuit coupled to the first circuit, the position threshold circuit associating a gain with the audio signals from the second microphone for comparison with the audio signals from the first microphone.

47. (Original) The system according to Claim 46, wherein the position estimation circuit further includes a pulse stretching circuit in electrical communication with the position threshold circuit, the pulse stretching circuit maintaining the error signal for a period of time to enable the audio signals from at least one of the first microphone and the second microphone to be provided to the output.

48. (Original) The system according to Claim 47, wherein the pulse stretching circuit comprises a reset circuit causing the error signal to enable the audio signals from at least one of the first microphone and the second microphone to be provided to the output.

49. (Currently Amended) A headset, comprising:
a supporting device adapted to be secured to a head of a user;
a boom coupled to the supporting device and adapted to be disposed proximate a desired acoustic source comprising a mouth of the user generating acoustic signals;
an acoustic pick-up device coupled to the boom and having a first microphone disposed at a first distance from the desired acoustic source, and a second microphone disposed at a second distance from the desired acoustic source, each of the first microphone and the second microphone receiving the acoustic signals, and in response, transducing the acoustic signals into audio signals;
a position estimation circuit coupled to receive the audio signals from the first microphone and the second microphone, and adapted to produce an error signal from the audio signals associated with the first and second microphones, the error signal representing an estimate of the acoustic pick-up device having angular and/or distance mispositioning relative to

the desired acoustic source that results in the acoustic signals received by the acoustic pick-up device failing to achieve proper and/or adequate noise cancellation and resulting in the acoustic signals being degraded, the position estimation circuit including a first circuit providing first and second time averages of corresponding magnitudes for the audio signals received from the first microphone and the second microphone, respectively, the error signal being produced from the first and second time averages; and

a controller ~~using~~ configured to use the error signal to select a directional response corresponding to at least one of the first and second microphones in order to compensate for the acoustic pick-up device being mispositioned by providing the audio signals from at least one of the first microphone and the second microphone to an output.

50. (Original) The system according to Claim 49, wherein the first circuit comprises a first absolute value detector and a first envelope detector receiving the audio signals from the first microphone, and a second absolute value detector and a second envelope detector receiving the audio signals from the second microphone.

51. (Currently Amended) A system for controlling a directional response of at least one of a first microphone and a second microphone, the system comprising:

first microphone means disposed at a first distance from a desired acoustic source;

second microphone means disposed at a second distance from the desired acoustic source, each of the first microphone means and the second microphone means receiving acoustic signals generated from the desired acoustic source, and in response thereto, transducing the acoustic signals into audio signals;

position estimation means coupled to receive the audio signals from the first and second microphone means, the position estimation means being adapted to produce an error signal from the audio signals associated with the first and second microphones, the error signal representing an estimate of the first and second microphone means having angular and/or distance mispositioning relative to the desired acoustic source that results in the acoustic signals received by the acoustic pick-up device failing to achieve proper and/or adequate noise cancellation and resulting in the acoustic signals being degraded, the position estimation means including means for averaging to generate first and second time averages of corresponding magnitudes for the

audio signals received from the first and second microphone means, respectively, the error signal being produced from the first and second time averages; and

control means ~~using~~ to use the error signal to select the directional response corresponding to at least one of the first and second microphones in order to compensate for the first and second microphone means being mispositioned by providing the audio signals from at least one of the first and second microphone means to an output.

52. (Original) The system according to Claim 51, wherein said control means adjusts a polar pattern of the audio signals received from the first and second microphone means to provide the audio signals to the output.

53. (Original) The system according to Claim 51, wherein the audio signals provided to the output include noise canceling from a combination of the audio signals from both the first and second microphones.

54. (Previously Presented) A method of controlling a directional response of at least one of a first and second microphones, the method comprising:

receiving acoustic signals generated by a desired acoustic source at a first microphone;

receiving the acoustic signals at a second microphone;

in response, the first and second microphones each transducing the acoustic signals respectively received into audio signals;

determining first and second time averages of corresponding magnitudes of the audio signals for the first microphone and the second microphone, respectively;

detecting an error signal amongst the audio signals from the audio signals associated with the first and second microphones, the error signal representing an estimate of the first and second microphones having angular and/or distance mispositioning relative to the desired acoustic source that results in the acoustic signals received by the acoustic pick-up device failing to achieve proper and/or adequate noise cancellation and resulting in the acoustic signals being degraded, the error signal being detected from the first and second time averages;

using the error signal to select the directional response corresponding to at least one of the first and second microphones in order to compensate for the first and second microphones being mispositioned; and

providing the audio signals associated with the directional response selected to an output.

55. (Original) The method according to Claim 54, wherein detecting an error signal comprises determining a ratio of the audio signals associated with the first microphone with the audio signals associated with the second microphone.

56. (Original) The method according to Claim 55, further comprising:
in response to the ratio determined, providing noise canceling microphone signals to the output.

57. (Original) The method according to Claim 54, wherein the audio signals provided to the output are a result of noise canceling determined by generating a difference between the audio signals associated with the first microphone and the audio signals associated with the second microphone.

58. (Previously Presented) The method according to Claim 54, further comprising:
activating an indicator in response to receiving the error signal to indicate the first and second microphones being mispositioned relative to the desired acoustic source.

59. (Original) The method according to Claim 54, wherein the first microphone comprises omnidirectional microphone and the second microphone comprises a directional microphone.

60. (Original) The method according to Claim 54, wherein the first and second microphones each comprises an omnidirectional microphone.

61. (Previously Presented) The method according to Claim 54, further comprising:
determining progressive levels of the first and second microphones being mispositioned relative to the desired acoustic source;

determining a corresponding phase shift based on a particular one of the progressive levels associated with the error;

introducing the corresponding phase shift with the audio signals associated with the second microphone to produce delayed signals;

providing at the output the delayed signals combined with the audio signals associated with the first microphone.

62. (Original) The method according to Claim 54, wherein the first microphone is disposed closer to the desired acoustic source than the second microphone.

63. (Original) The method according to Claim 54, wherein the directional response includes one of a figure eight pattern, a cardioid pattern, a hypercardioid pattern, and an omnidirectional pattern.

64. (Currently Amended) A method of sensing and compensating for an error, the method comprising:

receiving acoustic signals generated by a desired acoustic source at a first microphone;

receiving the acoustic signals at a second microphone;

in response, the first and second microphones each transducing the acoustic signals respectively received into audio signals;

determining first and second time averages of corresponding magnitudes of the audio signals for the first microphone and the second microphone, respectively;

detecting an error signal from the audio signals associated with the first and second microphones,

the error signal representing an estimate of the first and second microphones having angular and/or distance mispositioning relative to the desired acoustic source that results in the acoustic signals received by the first and second microphones failing to achieve proper and/or adequate noise cancellation and resulting in the acoustic signals being degraded, the error signal being detected from the first and second time averages; and

using the error signal to select the directional response corresponding to at least one of the first and second microphones in order to compensate for the first and second microphones being mispositioned; and

using the error signal to selectively provide ~~the audio signals from~~ a directional response corresponding to at least one of the first and second microphones to an output in order to compensate for the mispositioning.

65. (Original) The method according to Claim 64, wherein the audio signals provided to the output from at least one of the first and second microphones comprises noise canceling signals.

66. (Original) The method according to Claim 64, wherein using the error signal to selectively provide the audio signals from at least one of the first and second microphones to an output comprises adjusting a directional response of at least one of the first and second microphones.

67. (Original) The method according to Claim 66, wherein the directional response includes one of a figure eight pattern, a cardioid pattern, a hypercardioid pattern, and an omnidirectional pattern.

68. (Original) The method according to Claim 66, wherein the directional response includes one of a figure eight pattern, and an omnidirectional pattern.